

Allied to *M. vindex*, Smith, from S. Africa, and *M. prodigiosa*, Gerst., from E. Africa.

*Male*. Head, antennæ, prothorax, and legs reddish, a very narrow bright red line round the eyes, and the mouth also shading into bright red; mesothorax black above, with three carinæ in front, and a broad raised ridge behind; scutellum deeply incised; metathorax oval, truncated behind, and clothed with long hair. Pectus and abdomen clothed with a coppery green pile; the middle of the pectus with a few long grey hairs. Wings deep purple or violet, with blue and green reflections.

*Female*. Similar, but with the red colouring less marked, especially on the head and prothorax.

#### SPHEGIDÆ.

##### 4. PELOPÆUS ÆGYPTIUS.

*Sphex ægyptiæ*, Linn. Syst. Nat. i. p. 569, no. 4 (1758).

*Sphex spirifex*, Linn. loc. cit. p. 570. no. 8.

A common species in South Europe, and apparently spread over nearly the whole of Africa.

##### 6. On the Range of *Apogon ellioti*. By FRANCIS DAY, F.Z.S.

[Received April 29, 1881.]

*Apogon nigripinnis*, Günther, Catal. i. 1859, p. 235; Playfair, Fish. Zanzibar, 1866, p. 20 (not Cuv. & Val. ii. p. 152).

*A. ellioti*, Day, Fishes of India, part. i. 1875, p. 63, pl. xvii. fig. 1.

*A. arafuræ*, n. sp., Günther, Shore Fishes of 'Challenger,' 1880, p. 38, pl. xvi. fig. c.

Among the littoral forms of fishes collected by the 'Challenger' are some which appear to me to have a much wider range than is adverted to in the late interesting contribution to our ichthyological knowledge. Having been in London last week, I took the opportunity of re-examining the forms in the national Museum recorded as *A. nigripinnis*, and likewise the fine single example of *A. arafuræ* brought home by the Expedition from the Arafura Sea.

I would premise that, having had the opportunity of comparing the example at the Jardin des Plantes, said to be the type of *A. nigripinnis*, C. V., with the one I figured in the 'Fishes of India,' pl. xvi. fig. 6, I feel confident of their being identical. I also think that there can exist but little reasonable doubt that most of the specimens named *A. nigripinnis* in the British Museum are young examples of *A. ellioti*. They were received from Zanzibar, the East Indies, and China.

When I published the 'Fishes of India,' I only possessed two examples from India. Since that time, owing to the kindness of Dr.

Keess and others, I have received several more from Madras, and am consequently able to distribute them among various European museums.

The example of *A. arafurae* still shows the faint vertical bands which are so much better seen in the immature. The dorsal spines are damaged; and the fish has its mouth distended, in which position it has become permanently fixed, owing probably to having been put into rather strong spirit soon after its capture.

*Apogon ellioti* is one of those shore forms which extend through the Indian Ocean from the east coast of Africa to the Malay archipelago and China, likewise to the Arafura Sea on the coast of New Guinea. It is rather remarkable that Dr. Bleeker did not obtain it; he had one from my collection, and informed me that it was new to him.

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June 7, 1881.

Professor Flower, LL.D., F.R.S., President, in the Chair.

The Secretary called the attention of the Meeting to the opening of the Insectarium in the Society's Gardens, which had taken place on the 25th of April last; and remarked, that although of late years many entomologists had been in the habit of rearing insects in captivity for the purpose of watching their transformations and obtaining good specimens in each stage of existence, nothing like a systematic attempt, so far as he knew, had been previously made to form a general collection of living insects for exhibition. As in former days as regards reptiles and the lower marine animals, so in the present instance as regards its Insectarium, the Society seemed to be first in the field, and, so far as could be judged from the progress already made, to be likely, if not altogether successful, to attain many interesting and instructive results.

The building in the Gardens now used as an Insectarium was constructed of iron and glass on three sides, with a brick back to it, and formerly formed part of the refreshment buildings. It had been moved to its present site, on the north bank of the canal near the north entrance, last autumn, and had been used during the winter as a nursery for delicate monkeys and tropical birds. The cases containing the insects, to which it was now devoted, were arranged on stands all round the building, and also occupied two tables in the centre. The cases used for the principal specimens were formed of zinc plates. The upper part of them was glazed on all four sides, the top being formed of perforated zinc so as to admit the air. The food-plant or object required for the suspension of the chrysalises, when that stage of the insect was exhibited, was inserted into the case through a circular hole in the bottom; but the glass front also opened, so that ready access could be obtained to the interior. The larger cases in the front row measured about 24 inches in breadth by 18 in depth, and were 32 inches in height.

The cases in the opposite row were of similar construction, but rather smaller in dimensions.

The cases on the south side (on each side of the entrance door) have been mostly appropriated to the exhibition of the larger and finer species of silk-producing moths of the family Bombycidae. Amongst them might be specially noticed Glover's Silk-moth (*Samia gloveri*) and the Cecropian Silk-moth (*S. cecropia*) of North America, Perny's Silk-moth (*Attacus pernyi*) of Northern China, the Tusseh Silk-moth (*A. mylitta*) of India, and the great Emperor Moth (*Saturnia pyri*) of Europe.

On the north side of the Insectarium the smaller cases were devoted principally to the rarer and more noticeable moths and butterflies of Europe, such as the Swallow-tailed Butterfly (*Papilio machaon*), the Black-veined Butterfly (*Aporia crataegi*), the Purple Emperor (*Apatura iris*), and the Orange-tip (*Anthocharis cardamines*), among the former, and the Scarlet Tiger-moth (*Callimorpha dominula*) and Emperor Moth (*Saturnia carpini*), among the latter group. The series was continued, mixed with other forms, at the east end of the building. On the large tables in the middle of the Insectarium were examples of other butterflies, moths, beetles, mayflies, stoneflies, and aquatic insects of different kinds. The whole series exhibited now contained examples of about fifty species; but daily additions were made to it.

Finally, the Secretary observed, every specimen in the Insectarium was distinctly labelled, and that over each of the principal cases was fixed a glazed box, in which was placed preserved specimens of the various stages of metamorphosis of the insect exhibited in the case beneath.

The Insectarium had been placed under the sole charge of Mr. William Watkins, an experienced entomologist and breeder of insects, whose name was well known to many naturalists. Mr. Watkins, whose services had been secured for the Society for the purpose of inaugurating this interesting exhibition, had prepared the subjoined Report on the insects already bred and exhibited under his charge.

*Report on the Insects exhibited in the Insectarium during the month of May 1881.*

1. EXOTIC LEPIDOPTERA.

*Samia gloveri*.—Specimens of this species emerged almost daily through the month; and fertile eggs were obtained, which hatched on the 12th instant. The larvæ when hatched are a shining black, with numerous spines of the same colour; after the first change, which took place in six days, they assume a yellowish colour; at the second moult they become green with paler-coloured spines, each tipped with bright red. A choice of many shrubs were given them, but although they ate plum and sallow they left these for gooseberry, which they are now thriving well upon.

*Samia cecropia*.—This species emerged through the month, and

copulation was frequent; a large number of eggs were obtained, but many are not fertile, perhaps owing to the stock already having been interbred. Young larvæ hatched on the 14th instant, and are growing well. Food-plant Plum.

*Attacus cynthia*.—This species commenced to emerge towards the end of the month, but only 4 specimens have yet appeared. It is usually the latest species of all.

*Attacus pernyi*.—Perfect insects of this species were on view throughout the month. Fertile eggs obtained, which commenced to hatch 30th instant, and are doing well. Food-plant Oak.

*Attacus mylitta*.—This species commenced to emerge on 28th instant, a beautiful male being bred; on the following day a male and female emerged, the first male was therefore preserved. Eggs obtained, which are probably fertile.

*Attacus atlas*.—Throughout the latter half of the month specimens of this species have emerged, and many fine ones are preserved. Eggs will probably be obtained later; many more still to come out.

*Actias selene*.—The first specimen of this species emerged on the last day of the month.

*Actias luna*.—During the early part of the month specimens of this species emerged. Eggs have been obtained, but it is doubtful if they are fertile.

*Telea promethea*.—The cocoons of this species have as yet only produced a large Ichneumon-fly (*Ophion*, sp. inc.). Many visitors have evinced great interest on seeing these large parasites in the cage produced from perfectly-formed Lepidopterous cocoons externally, and internally a stout well-made oval cocoon of the Hymenoptera.

*Anthæra yama-mai*.—The larvæ of this species produced from eggs have done fairly well; many are now nearly full fed and about to spin. Food-plant Oak.

#### BRITISH LEPIDOPTERA.

##### *Rhopalocera.*

*Papilio machaon*.—Imagines of this species have been on view almost daily throughout the month.

*Anthocharis cardamines*.—During the first half of the month imagines of this species were bred.

*Aporia cratægi*.—Small larvæ of this species were obtained and fed up, producing the first imagines 27th instant. The three stages of larva, pupa, and imago are now exhibited.

*Apatura iris*.—This species has unfortunately not done well. I was unable to detect them in the act; but the numbers slowly diminished, and I am led to the conclusion that the larvæ are cannibals. On several occasions I observed them worrying each other. Only 2 out of 24 larvæ have been saved; the first of these is now a pupa, the other feeding up. There were 6 larvæ found dead.

*Limnitis sibylla*.—This species was bred from small larvæ obtained from the New Forest and Germany; and the three stages were on view during the last ten days of the month.



*Melitæa cinxia*.—Imagines of this species were bred from larvæ during the month; and perfect insects were on view nearly the whole month through.

*Nemeobius lucina*.—Imagines of this species emerged from pupæ during the month.

#### *Heterocera.*

*Chelonia caja*.—Larvæ of this species attained a fine size, and produced large imagines, commencing to emerge at the latter end of the month.

*Chelonia villica*.—The larvæ of this species spun up during the early part of the month; and many fine imagines have been produced during the last ten days of the month.

*Callimorpha dominula*.—Larvæ and pupæ of this species were on exhibition during first half of the month, and imagines during last half. The species fed up well, and produced full-sized imagines.

*Odonestis potatoria*.—This species fed very slowly during the month. Cocoons were formed towards the latter end.

*Orgyia gonostigma*.—The handsome larvæ of this species were exhibited during the earlier part of the month, and some females (apterous) bred and exhibited.

*Lasiocampa quercifolia*.—The larvæ of this species fed up well, and produced full-sized cocoons towards the end of the month.

*Saturnia carpini*.—Larvæ of this species hatched from eggs obtained May 24. Food-plant Plum.

*Bombyx neustria*.—A colony of these larvæ were obtained small, and have fed up well, many cocoons being in the cage at end of the month.

*Cossus ligniperda*.—A piece of the branch of a willow-tree much bored, and containing larvæ of this species, was exhibited from the 28th instant.

*Catocala fraxini*.—The larvæ of this species obtained from eggs grew well till they were nearly an inch long, when they refused food and gradually died off. A second batch retained in my studio were then placed in the Insectarium; and these likewise died. I think they were hatched too early.

*Catocala sponsa*.—Young larvæ of this species obtained from eggs did not do well, gradually dying off. I retained a few in my studio, and put them in the Insectarium when an inch long; and they rapidly fed up, and are nearly full-fed.

*Uropteryx sambucata*.—The stick-like larvæ of this species were very interesting when visitors could distinguish them from the twigs of hawthorn upon which they were feeding.

#### EUROPEAN RHOPALOCERA.

*Apatura ilia*.—Two larvæ of this species obtained from Germany. Both are now full-fed and about changing.

*Melitæa maturna*.—Imagines of this species were bred from larvæ sent from Germany.

## EUROPEAN HETEROCERA.

*Heterogynis penella*.—A batch of freshly-hatched larvæ were presented by Lord Walsingham on the 23rd instant. The larvæ are growing slowly, and feed upon the cultivated yellow-flowering *Genista*, drilling regular little round holes in the leaves.

## BRITISH HYMENOPTERA.

A piece of heather containing three cocoons of the Sand-Wasp (*Pelopæus*, sp. inc.) were presented to the Society by Col. Irby, F.Z.S., and produced two imagines 23rd and 24th instant.

## BRITISH NEUROPTERA.

The larvæ of *Libellula depressa* have done well; but those of *Agrion*, sp. inc., have all died. It is probable that these species require running water of a temperature not above 50°. *Ephemera*, sp. inc., grew well, and produced two imagines.

## EUROPEAN NEUROPTERA.

*Myrmeleon formicarius*.—Fifteen larvæ of this insect were obtained from France, and have established themselves in some sand in a glass shade, exhibiting their pits as in a wild state.

## BRITISH COLEOPTERA.

Imagines of *Dytiscus marginalis*, *Hydrophilus piceus*, and *Cicindela campestris* exhibited. One larva of *Dytiscus marginalis* was exhibited for half the month, when it was attacked by a species of fungus and died.

## BRITISH TRICHOPTERA.

Caddis-flies (*Phryganea*, sp. inc.).—These have lived, and many are probably mere pupæ.

## EXOTIC ORTHOPTERA.

Eggs of 5 species of Leaf-insects were received from Mr. Waterhouse, British Museum, and are exhibited in a suitable vessel should they hatch.

There have also been exhibited :—

## BRITISH HEMIPTERA.

*Notonecta glauca*, and eggs obtained, which hatched and attained half growth.

*Nepa cinerea*; and

Aquatic Spiders (ARACHNIDA).

## GENERAL REMARKS.

I have not been able to add a number of species that I should have wished, owing to a severe illness, which suddenly attacked me on the 14th instant.

The imagines that have emerged have nearly all been fine and perfect, a very small percentage indeed of deformed insects coming out; and as a rule the house is well adapted, in my opinion, for any exotic species and most of the British, the latter emerging much earlier than would be the case in their wild state; but there is no apparent diminution in size, speaking from imagines obtained from small larvæ, as is frequently the case with larvæ bred in confinement.

June 6, 1881.

WM. WATKINS.

The following papers were read:—

1. On the Development of the Skeleton of the Paired Fins of Elasmobranchii, considered in Relation to its Bearings on the Nature of the Limbs of the Vertebrata. By F. M. BALFOUR, F.R.S., F.Z.S., Fellow of Trinity College, Cambridge.

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(Plates LVII., LVIII.)

Some years ago the study of the development of the soft parts of the fins in several Elasmobranch types, more especially in *Torpedo*, led me to the conclusion that the vertebrate limbs were remnants of two continuous lateral fins<sup>1</sup>. More or less similar views (which I was not at that time acquainted with) had been previously held by MacIise, Humphrey, and other anatomists; these views had not, however, met with much acceptance, and diverge in very important points from those put forward by me. Shortly after the appearance of my paper, J. Thacker published two interesting memoirs comparing the skeletal parts of the paired and unpaired fins<sup>2</sup>.

In these memoirs Thacker arrives at conclusions as to the nature of the fins in the main similar to mine, but on entirely independent grounds. He attempts to show that the structure of the skeleton of paired fins is essentially the same as that of the unpaired fins, and in this comparison lays special stress on the very simple skeleton of the pelvic fin in the cartilaginous Ganoids, more especially in *Acipenser* and *Polyodon*. He points out that the skeleton of the pelvic fin of *Polyodon* consists essentially of a series of nearly isolated rays, which have a strikingly similar arrangement to that of the rays of the skeleton in many unpaired fins. He sums up his views in the following way<sup>3</sup>:—

<sup>1</sup> Monograph on the Development of Elasmobranch Fishes, pp. 101, 102.

<sup>2</sup> J. K. Thacker, "Median and Paired Fins; a Contribution to the History of the Vertebrate Limbs," Trans. of the Connecticut Acad. vol. iii. 1877.

J. K. Thacker, "Ventral Fins of Ganoids," Trans. of the Connecticut Acad. vol. iv. 1877.

<sup>3</sup> *Loc. cit.* p. 298.